

REMARKS

Applicants' invention, as delineated by pending claims 1-12 and 15-18, is directed to a glass fiber-reinforced gypsum board. Prior to being incorporated into the gypsum slurry used to form the board core, the fibers are provided with a roughened surface created using a silane based sizing composition containing nano or micro particles, such as colloidal silica, clay, or other inorganic particles. The roughened surface of glass fiber with nano or micro particles compliantly bonded with silane polymer transfers load from the gypsum matrix to the glass fibers, thereby providing the board with improved strength and flexure resistance. These mechanical properties are highly desirable, as they facilitate manufacture, transport, and handling of the board prior to installation, and improve the durability and performance of the boards during their end use in common building applications.

Claims 13-14 stand withdrawn as being directed to a different invention.

Claims 1-12 and 15-18 were rejected under 35 USC 103(a) as being unpatentable over US Patent 6,106,607 to Be in view of US Patent 6,187,697 to Jaffee.

Be is directed to a water repellent composition for gypsum containing masonry materials. The composition contains an organohydrogensiloxane and polyvinyl alcohol said to provide high water repellency. Jaffe provides multiple layer, nonwoven fibrous mats with a body portion layer and a surface layer portion.

The Be reference admittedly discloses gypsum board in which glass fibers are provided by introducing them into a slurry used to deliver the gypsum. Acknowledging that Be fails to disclose or suggest the inclusion of particles, as required by claims 1-12 and 15-18, the Examiner has further applied Jaffee. Pointing to col. 1, lines 5-25; col. 2, lines 20-30 and lines 60-67; and col. 5, lines 5-67, the Examiner has asserted that Jaffee discloses inclusion of particles in the process of treating glass fibers prior to use in gypsum

boards. It is alleged that it would have been obvious to one having ordinary skill in the art to add particles to the Be composition as suggested by Jaffee since such would improve processability and mechanical properties of the gypsum board.

It is settled law that to establish a *prima facie* case of obviousness, evidence must be adduced to satisfy all of the following criteria:

- There must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skilled in the art, to modify the references;
- There must be a reasonable expectation of success; and
- The prior art must teach or suggest all of the claimed limitations.

In the present instance, it is respectfully submitted that such a burden has not been met. Applicants respectfully traverse both the Examiner's contention that the combination teaches or suggests all of the claimed features and the purported motivation for the combination.

More specifically, Jaffee et al. discloses use of particles, but never in terms of particles on glass fibers destined for the core of a gypsum board. Instead, the particles are discussed only with reference to a non-woven mat used as the facer of the gypsum board. An even further and more important distinction arises because the Jaffee et al. mat is a multi-layer mat. Significantly, the particles are only disposed in the surface portion layer, and not in the body portion layer, which might be in contact with the gypsum core in the finished board. Citing col. 1, lines 25-37; col. 2, lines 10-30; and col. 4, lines 19-50, the Examiner asserts that Jaffee et al. teaches that it is known in the art to include particles in the process of treating glass fibers prior to use in gypsum boards. However, the Jaffee et al. particles are located in the surface mat, not on fibers dispersed in the gypsum matrix core, as provided by claims 1-12 and 15-18. Nothing suggests particles on reinforcing fibers or the altogether different role played by particles there located, viz. the

improvement of bonding between the gypsum core and the reinforcing fibers and consequent increase in mechanical and flexural strength of finished board.

Applicants further submit that nothing in Jaffee et al. discloses or suggests that the particles used are micro or nano particles, as delineated by feature (f) of claim 1 and feature (e) of claim 7. Instead, Jaffee et al. teaches the use of much larger particles. Attention is respectfully drawn to col. 2, lines 32-36, at which Jaffee et al. states that "Particles, when used in the surface portion according to this invention, are preferably sized so that less than a few percent, preferably less than one wt. percent of the particles will pass through the openings between the fibers in the nonwoven mat." (Emphasis added.) A preferred range of particle size is said to be within the range of minus 40 and plus 100 US standard mesh. These mesh sizes correspond to sieve openings of 0.354 and 0.149 mm. It is respectfully submitted that a person having ordinary skill in the art would not understand particles specified by such mesh sizes as being micro or nano particles, as those terms are used by applicants. Such particles are generally said to have diameters in the range of about 5 nm to 10 μm (page 13, lines 34-35).

The foregoing preferred dimensions of the Jaffee et al. particles are chosen expressly to inhibit passage of the particles through the non-woven mat and into the board core. It is respectfully submitted that this dimensional choice further confirms the distinction between particles present on glass fibers in the surface mat and particles bound to fibers reinforcing the gypsum matrix core, thereby teaching away from the latter.

Applicants thus maintain that Be and Jaffee et al., even in combination, fall far short of disclosing or suggesting applicants' claimed gypsum board, in which fibers coated with a silane composition and processed to provide a roughened surface having nano or micro particles bonded to the fibers is present within the gypsum matrix. Any particles disclosed by Jaffee et al. are, at best, present solely in the outside surface of the facers of the gypsum board. Moreover, the Jaffee et al. particles are not nano or micro particles.

Consequently, applicants submit that the Examiner has not established any motivation for the substantial reconstruction of Jaffee et al. that would be entailed in selecting particles of the markedly different size required by applicants' claims and in disposing such particles in an altogether different place, i.e., on the surface of glass reinforcing fibers in the gypsum matrix, and not in the surface-most portion of facing sheets for the gypsum board. The Examiner clearly has not pointed to any disclosure or suggestion within the Be or Jaffee et al. references that motivates either the proposed combination or the substantial reconstruction.

The Examiner has indicated that addition of particles would improve processability and mechanical properties of the claimed gypsum board, as allegedly providing motivation for the proposed combination and reconstruction. However, no teaching in the prior art is adduced to support these assertions. Such a claim is submitted to be a mere restatement of the surprising and unexpected benefit of improved gypsum board mechanical properties that is derived only by impermissible hindsight reconstruction based on applicants' own teaching. Furthermore, addition of particles clearly adds additional complication to any gypsum board production process, so that a person of ordinary skill in the art would be led away from the added complexity without some reasonable expectation of benefit to be gained thereby.

The Examiner has further alleged motivation to combine Be and Jaffee et al. based on optimizing the water repellent properties of the board by proper selection of particle type. Once again, no teaching in the prior art is adduced to support these assertions. Applicants traverse the pertinence of such an observation, even if true. It is not apparent how water repellency of a gypsum board is materially influenced by particles present only within the gypsum matrix, and nowhere near any surface on which water might impinge.

Applicants infer that the Examiner intends to take Official Notice that it is common knowledge that: (i) addition of particles to a sizing composition for matrix reinforcement fibers would improve processability and mechanical properties of gypsum board; and (ii)

proper selection of the type of particle to be incorporated in a sizing composition for matrix reinforcement fibers would improve the water repellency of a gypsum board using such fibers. In accordance with 37 C.F.R. § 1.104 (d)(2) and to preserve applicant's argument on appeal, applicant requests that the Examiner provide either a prior art reference or an affidavit that supports the foregoing alleged motivations based on the official notice, common knowledge, or personal knowledge of the Examiner. See *In re Lee*, 277 F.3d 1338, 1344-45, 61 U.S.P.Q.2d 1430, 1435 (Fed. Cir. 2002) (finding that reliance on "common knowledge and common sense" did not fulfill the PTO's obligation to cite references to support its conclusions and document its reasoning on the record so as to provide accountability and permit effective appellate review).

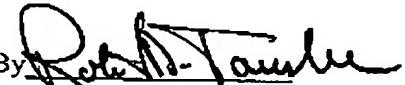
For these reasons, it is submitted that the combination of Be and Jaffee et al. does not disclose or suggest the gypsum board recited by present claims 1-12 and 15-18.

Accordingly, reconsideration of the rejection of claims 1-12 and 15-18 under 35 U.S.C. 103(a) as being obvious over the combination of Be and Jaffee et al. is respectfully requested.

CONCLUSION

In view of the foregoing remarks, it is respectfully submitted that the present application has been placed in allowable condition. Reconsideration of the Final Rejection, entry of this amendment, and allowance of claims 1-12 and 15-18 are, therefore, earnestly solicited.

Respectfully submitted,

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